

## 4.2 DIRECTED DFS DEMO

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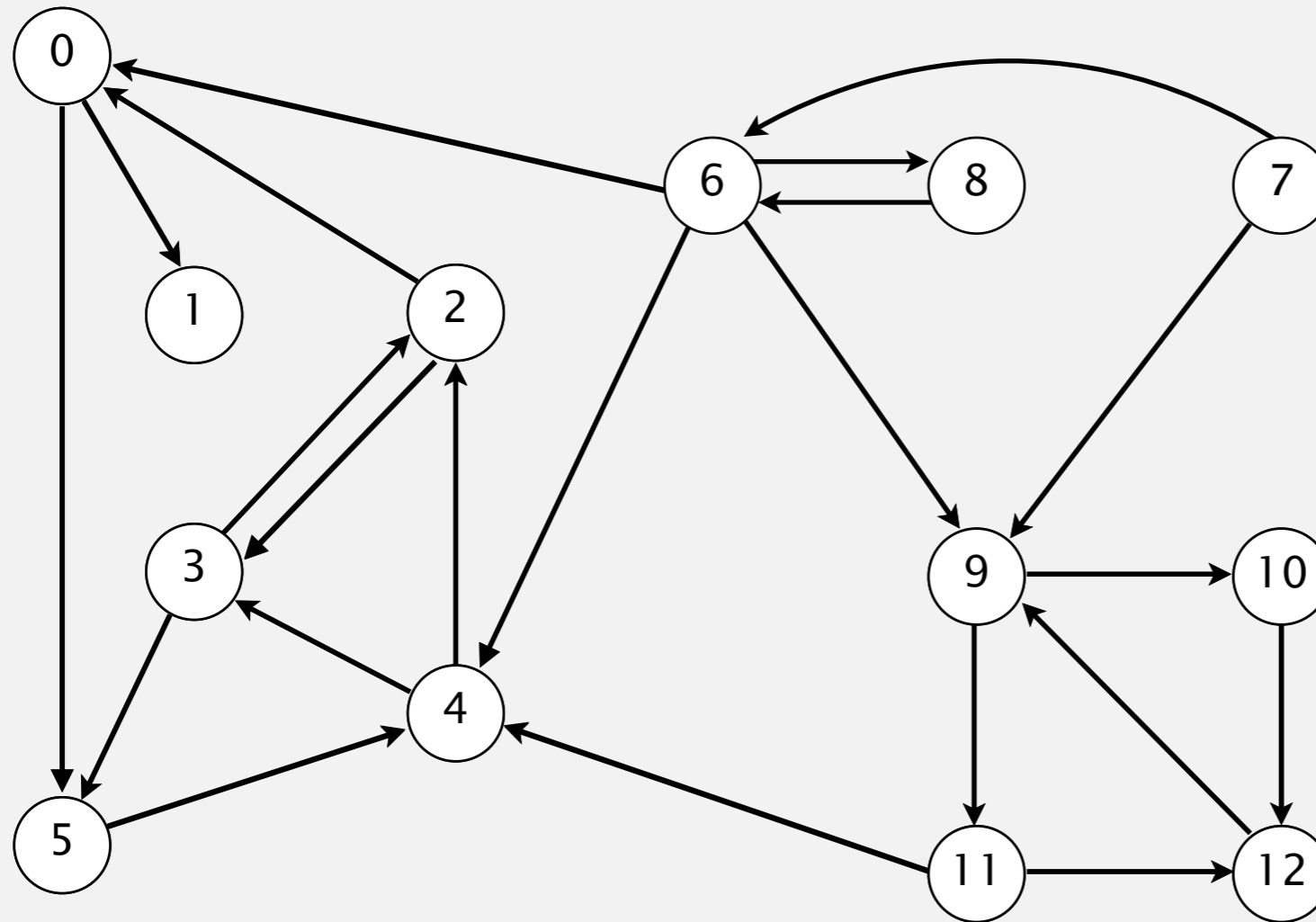


<http://algs4.cs.princeton.edu>

# Directed depth-first search demo

To visit a vertex  $v$ :

- Mark vertex  $v$  as visited.
- Recursively visit all unmarked vertices pointing from  $v$ .



**a directed graph**

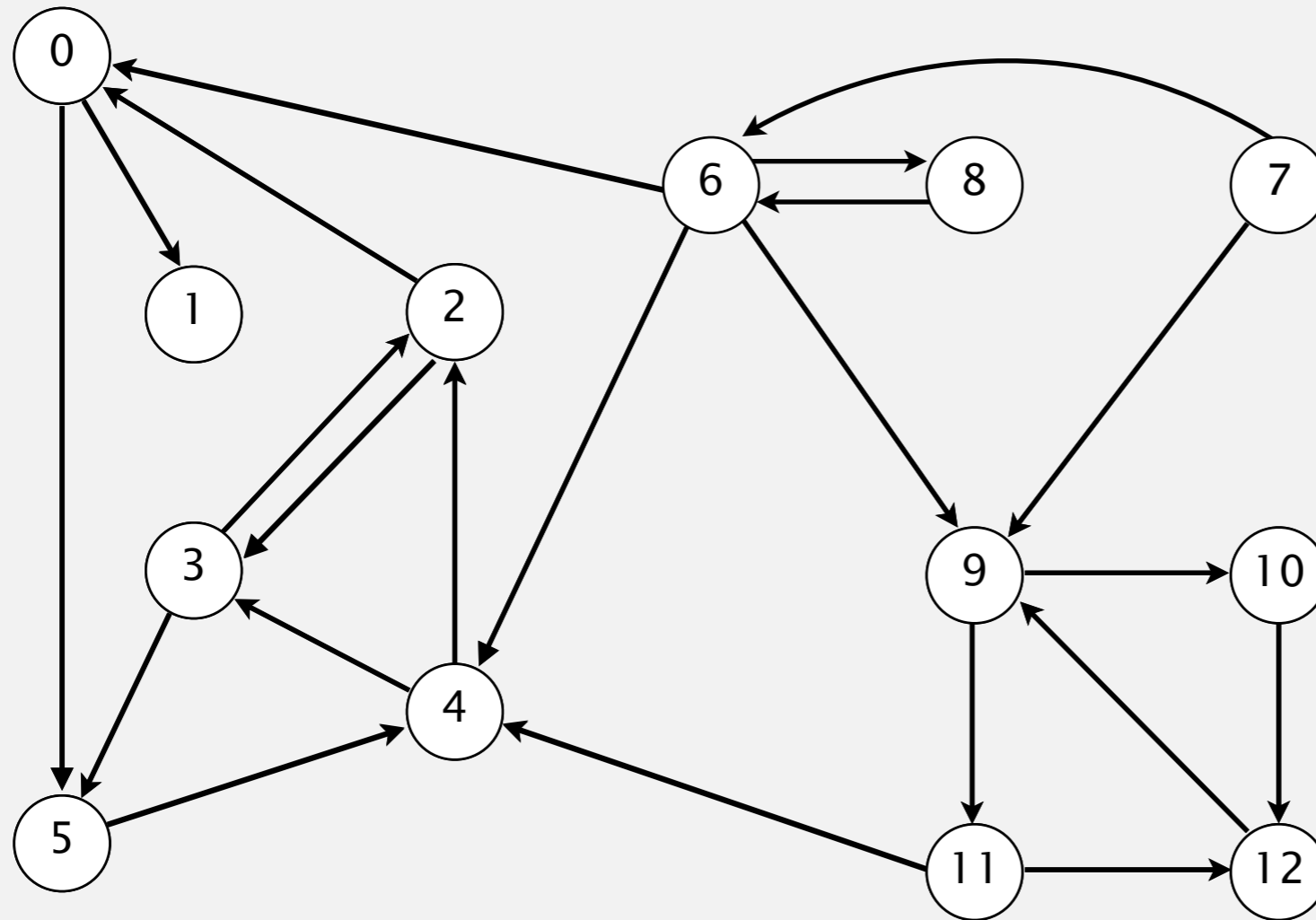
- 4→2
- 2→3
- 3→2
- 6→0
- 0→1
- 2→0
- 11→12
- 12→9
- 9→10
- 9→11
- 7→9
- 10→12
- 11→4
- 4→3
- 3→5
- 6→8
- 8→6
- 5→4
- 0→5
- 6→4
- 6→9
- 7→6

# Directed depth-first search demo

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To visit a vertex  $v$ :

- Mark vertex  $v$  as visited.
- Recursively visit all unmarked vertices pointing from  $v$ .



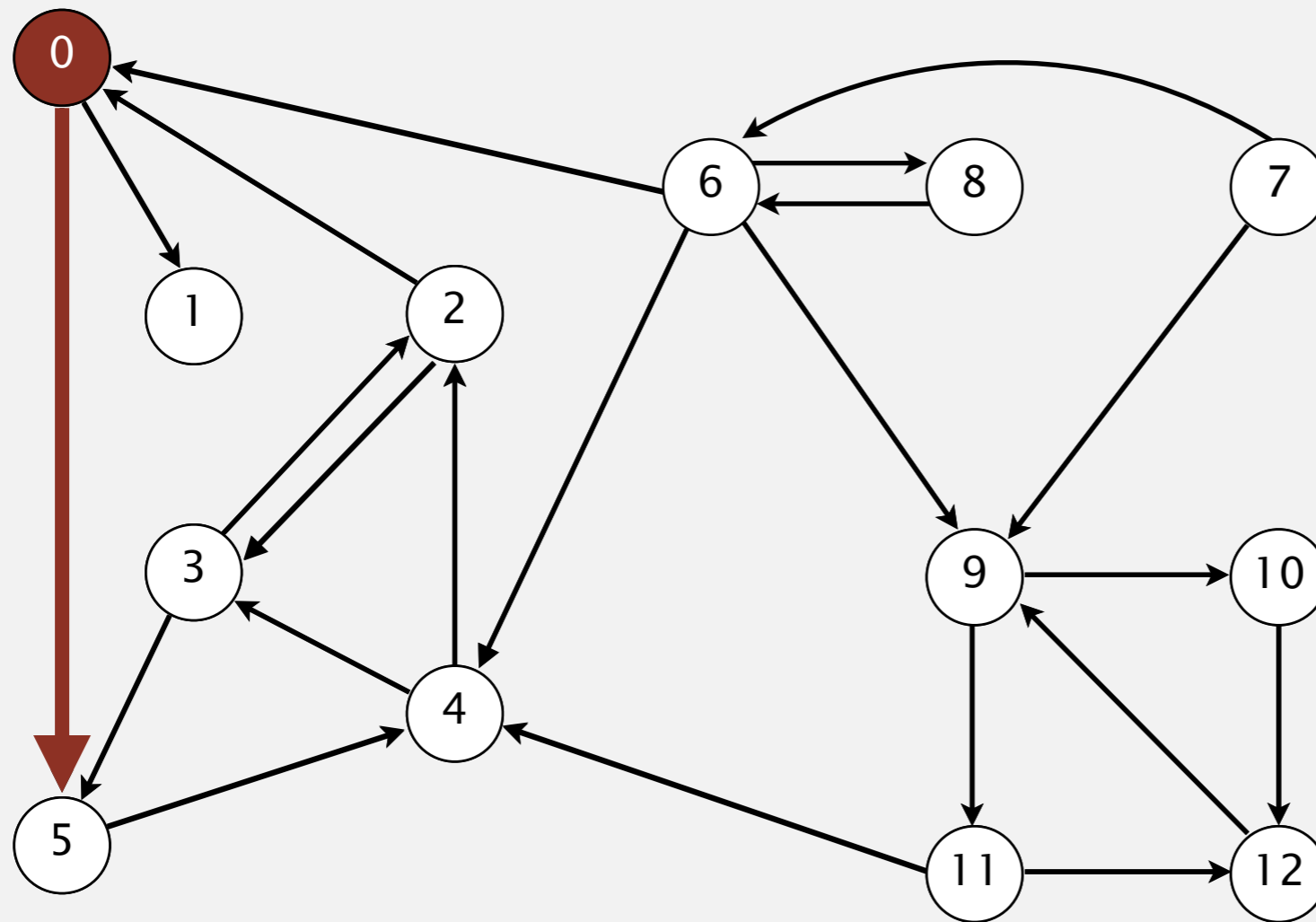
$v$	marked[]	edgeTo[]
0	F	—
1	F	—
2	F	—
3	F	—
4	F	—
5	F	—
6	F	—
7	F	—
8	F	—
9	F	—
10	F	—
11	F	—
12	F	—

**a directed graph**

# Directed depth-first search demo

To visit a vertex  $v$ :

- Mark vertex  $v$  as visited.
- Recursively visit all unmarked vertices pointing from  $v$ .



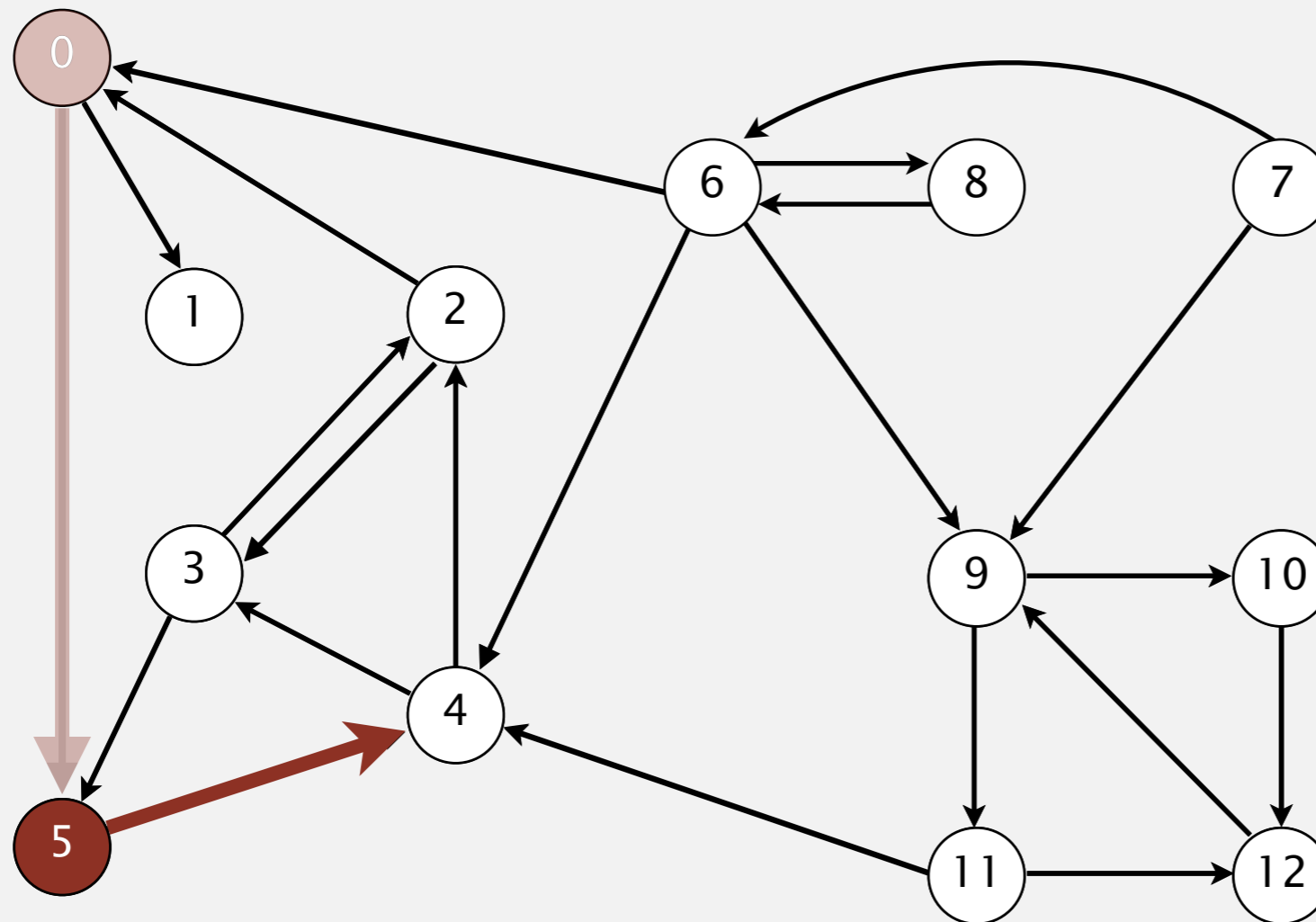
$v$	marked[]	edgeTo[]
0	T	-
1	F	-
2	F	-
3	F	-
4	F	-
5	F	-
6	F	-
7	F	-
8	F	-
9	F	-
10	F	-
11	F	-
12	F	-

visit 0: check 5 and check 1

# Directed depth-first search demo

To visit a vertex  $v$ :

- Mark vertex  $v$  as visited.
- Recursively visit all unmarked vertices pointing from  $v$ .



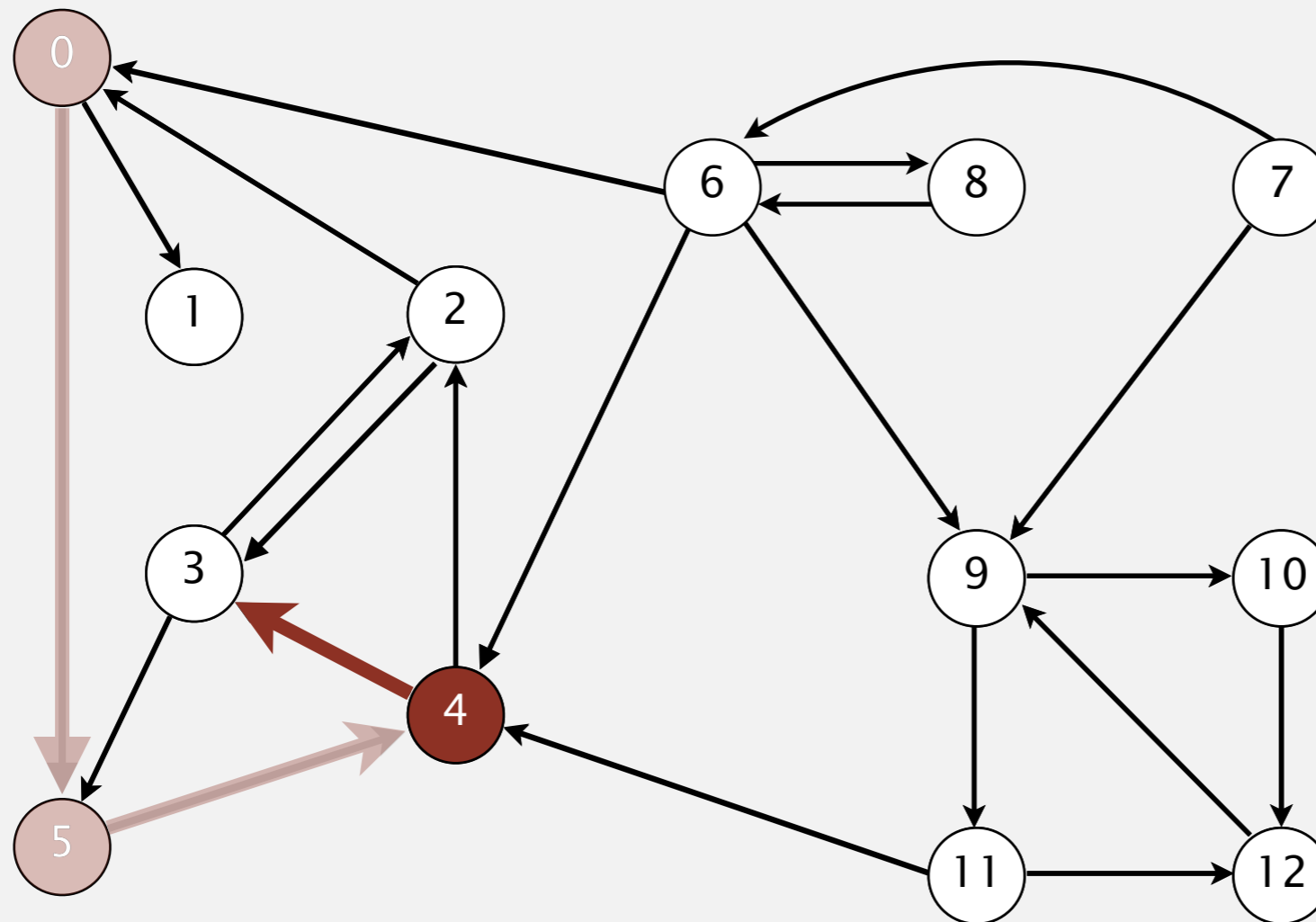
$v$	marked[]	edgeTo[]
0	T	-
1	F	-
2	F	-
3	F	-
4	F	-
5	T	0
6	F	-
7	F	-
8	F	-
9	F	-
10	F	-
11	F	-
12	F	-

visit 5: check 4

# Directed depth-first search demo

To visit a vertex  $v$ :

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- Recursively visit all unmarked vertices pointing from  $v$ .



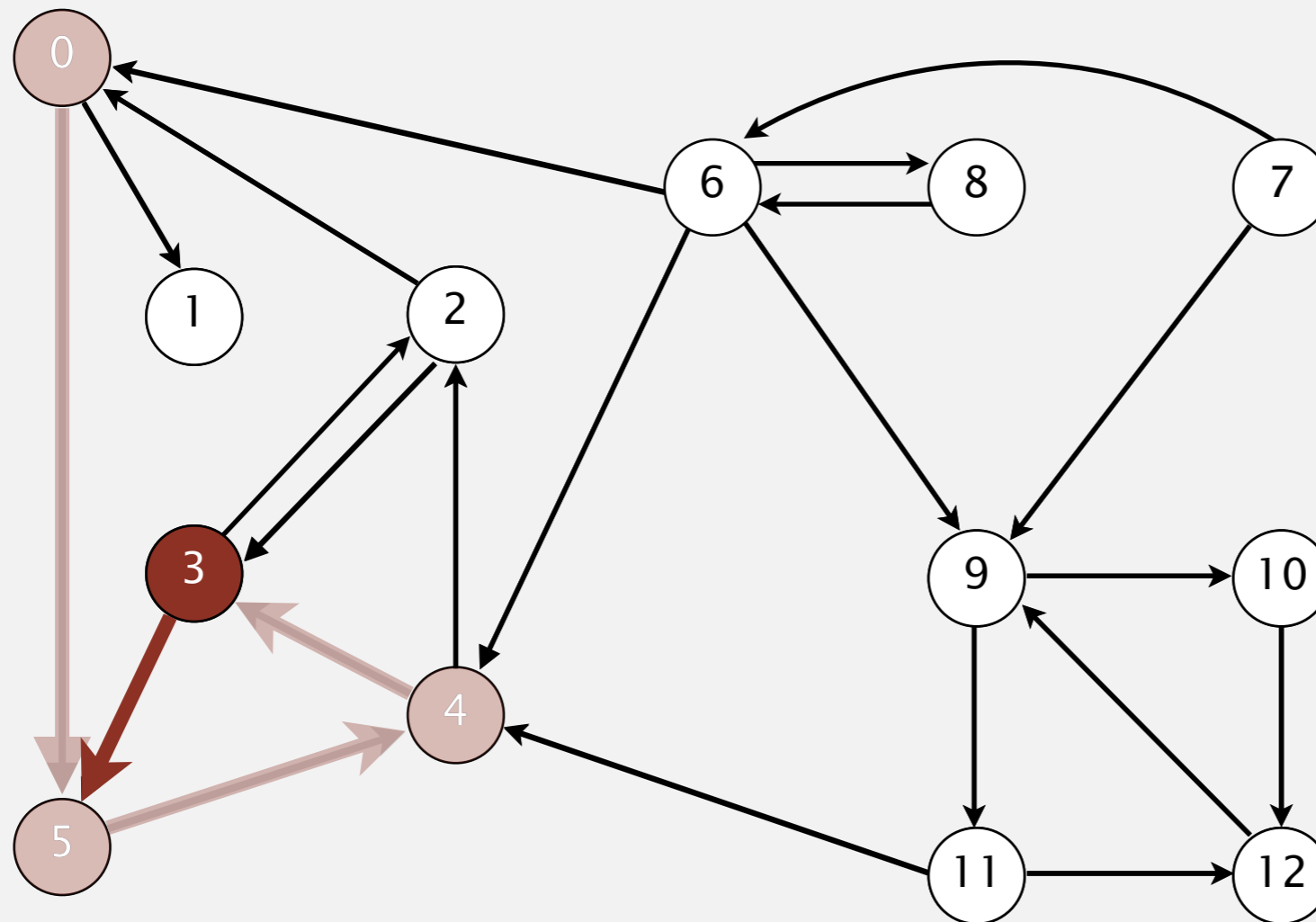
$v$	marked[]	edgeTo[]
0	T	-
1	F	-
2	F	-
3	F	-
4	T	5
5	T	0
6	F	-
7	F	-
8	F	-
9	F	-
10	F	-
11	F	-
12	F	-

visit 4: check 3 and check 2

# Directed depth-first search demo

To visit a vertex  $v$ :

- Mark vertex  $v$  as visited.
- Recursively visit all unmarked vertices pointing from  $v$ .



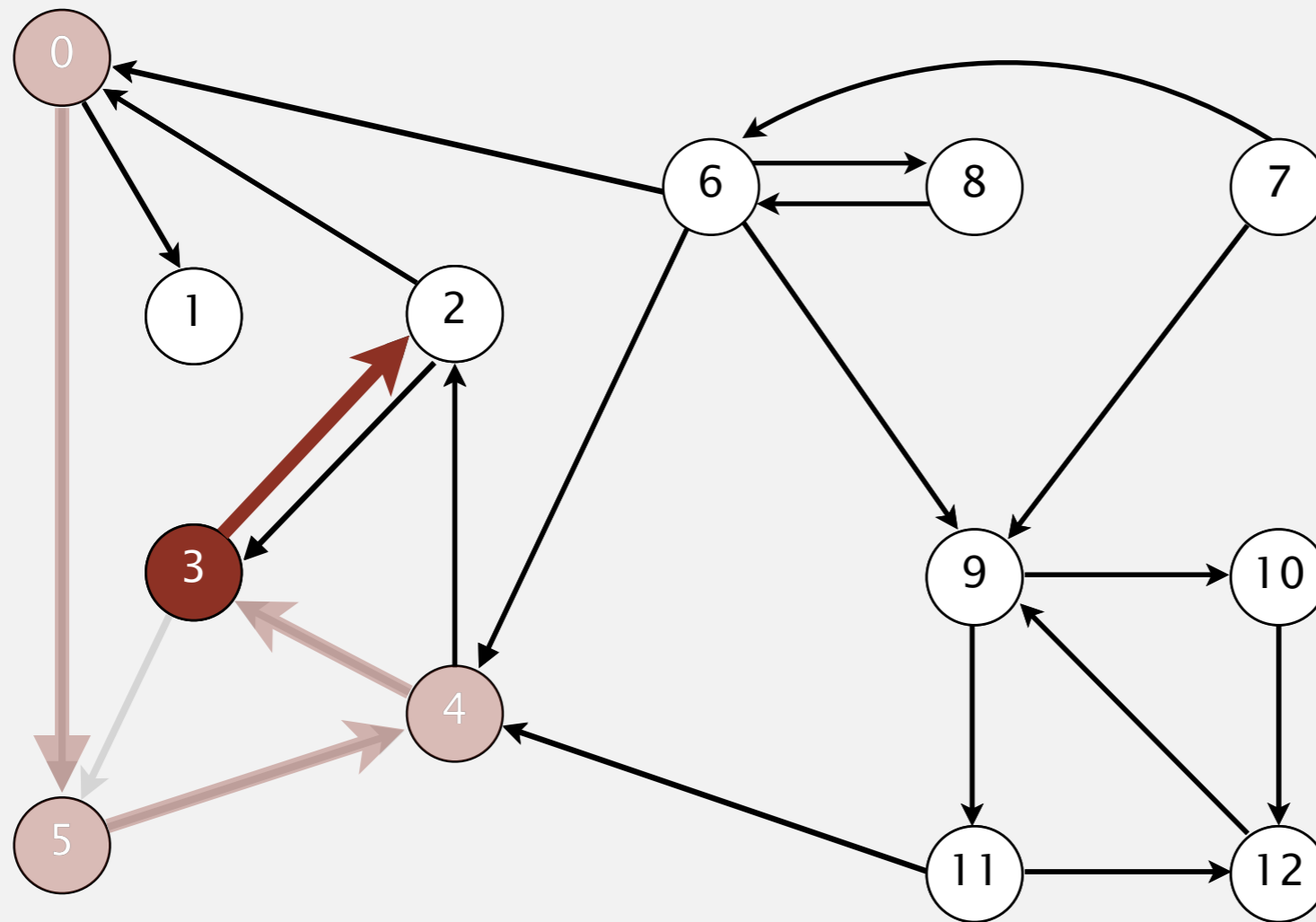
$v$	marked[]	edgeTo[]
0	T	-
1	F	-
2	F	-
3	T	4
4	T	5
5	T	0
6	F	-
7	F	-
8	F	-
9	F	-
10	F	-
11	F	-
12	F	-

visit 3: check 5 and check 2

# Directed depth-first search demo

To visit a vertex  $v$ :

- Mark vertex  $v$  as visited.
- Recursively visit all unmarked vertices pointing from  $v$ .



$v$	marked[]	edgeTo[]
0	T	-
1	F	-
2	F	-
3	T	4
4	T	5
5	T	0
6	F	-
7	F	-
8	F	-
9	F	-
10	F	-
11	F	-
12	F	-

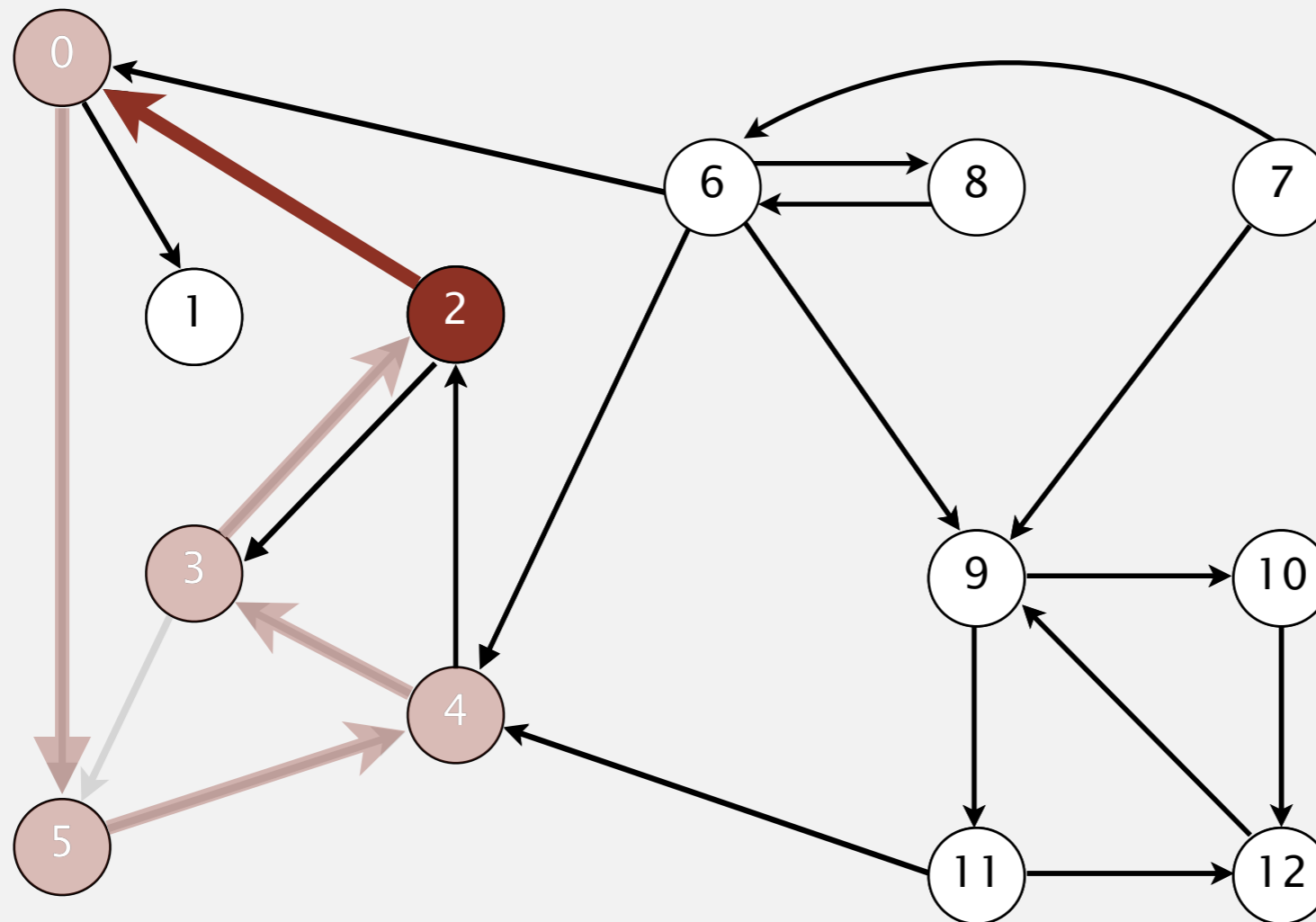
**visit 3:** check 5 and **check 2**



# Directed depth-first search demo

To visit a vertex  $v$ :

- Mark vertex  $v$  as visited.
- Recursively visit all unmarked vertices pointing from  $v$ .



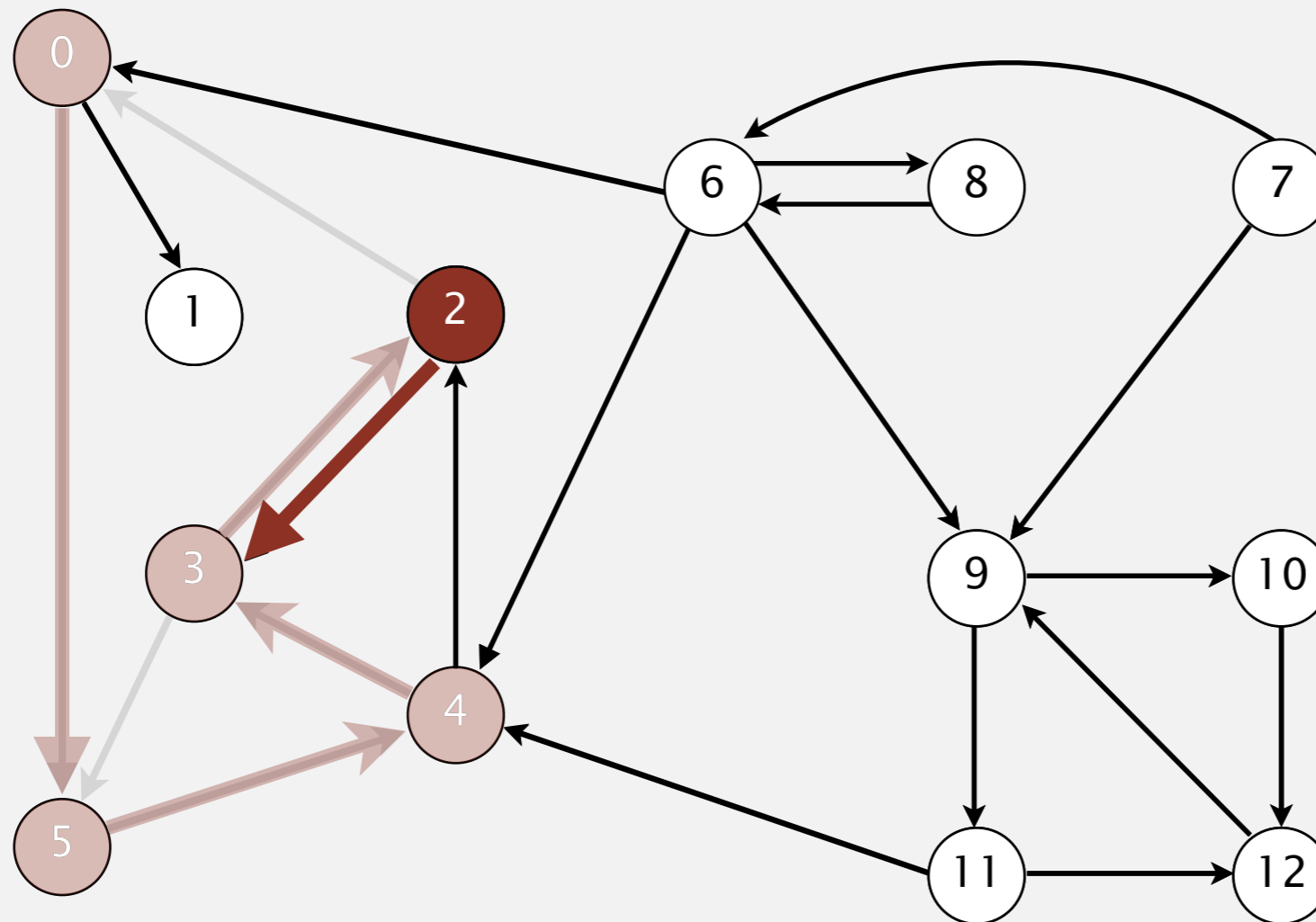
$v$	marked[]	edgeTo[]
0	T	-
1	F	-
2	T	3
3	T	4
4	T	5
5	T	0
6	F	-
7	F	-
8	F	-
9	F	-
10	F	-
11	F	-
12	F	-

visit 2: check 0 and check 3

# Directed depth-first search demo

To visit a vertex  $v$ :

- Mark vertex  $v$  as visited.
- Recursively visit all unmarked vertices pointing from  $v$ .



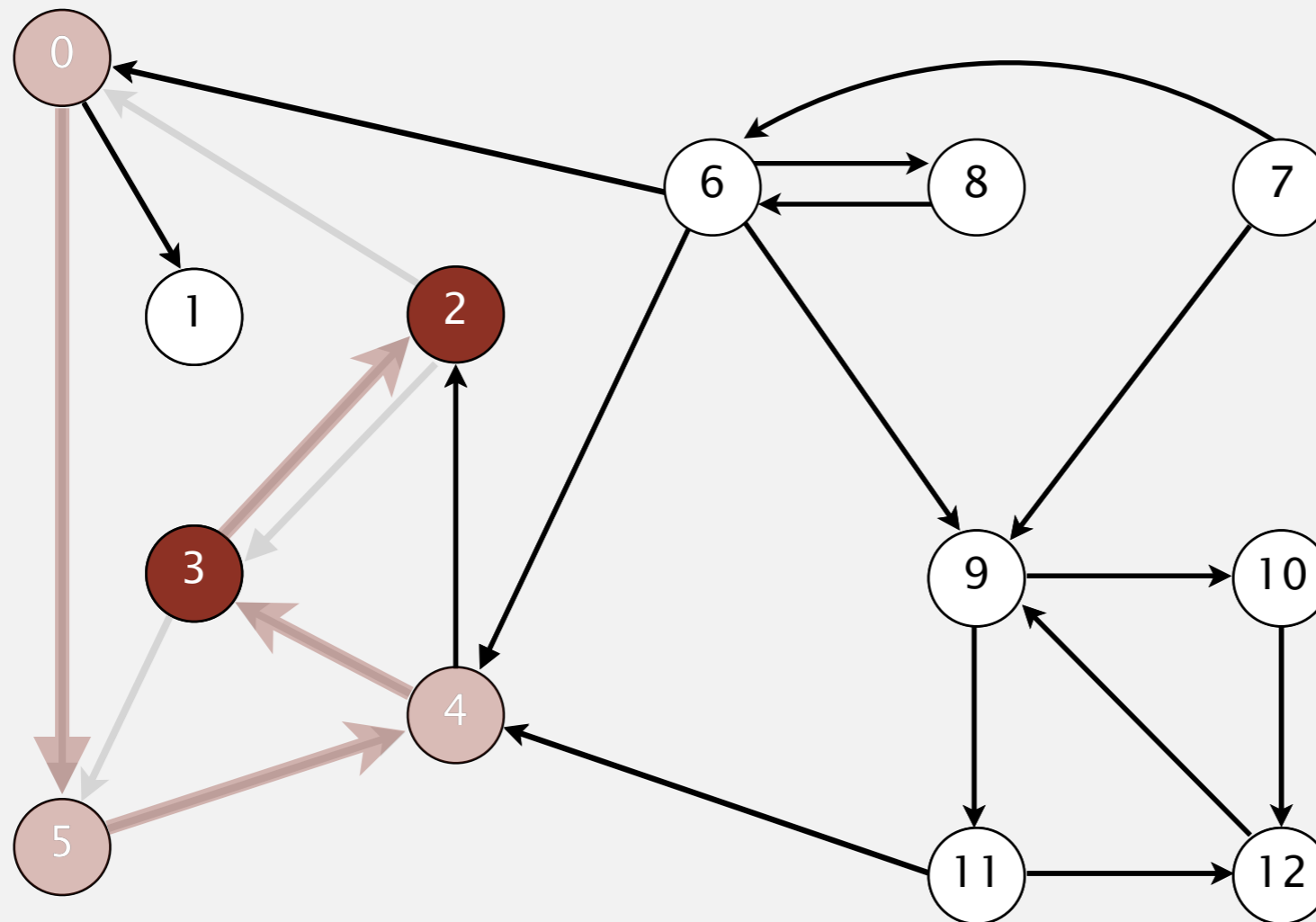
$v$	marked[]	edgeTo[]
0	T	-
1	F	-
2	T	3
3	T	4
4	T	5
5	T	0
6	F	-
7	F	-
8	F	-
9	F	-
10	F	-
11	F	-
12	F	-

**visit 2:** check 0 and **check 3**

# Directed depth-first search demo

To visit a vertex  $v$ :

- Mark vertex  $v$  as visited.
- Recursively visit all unmarked vertices pointing from  $v$ .



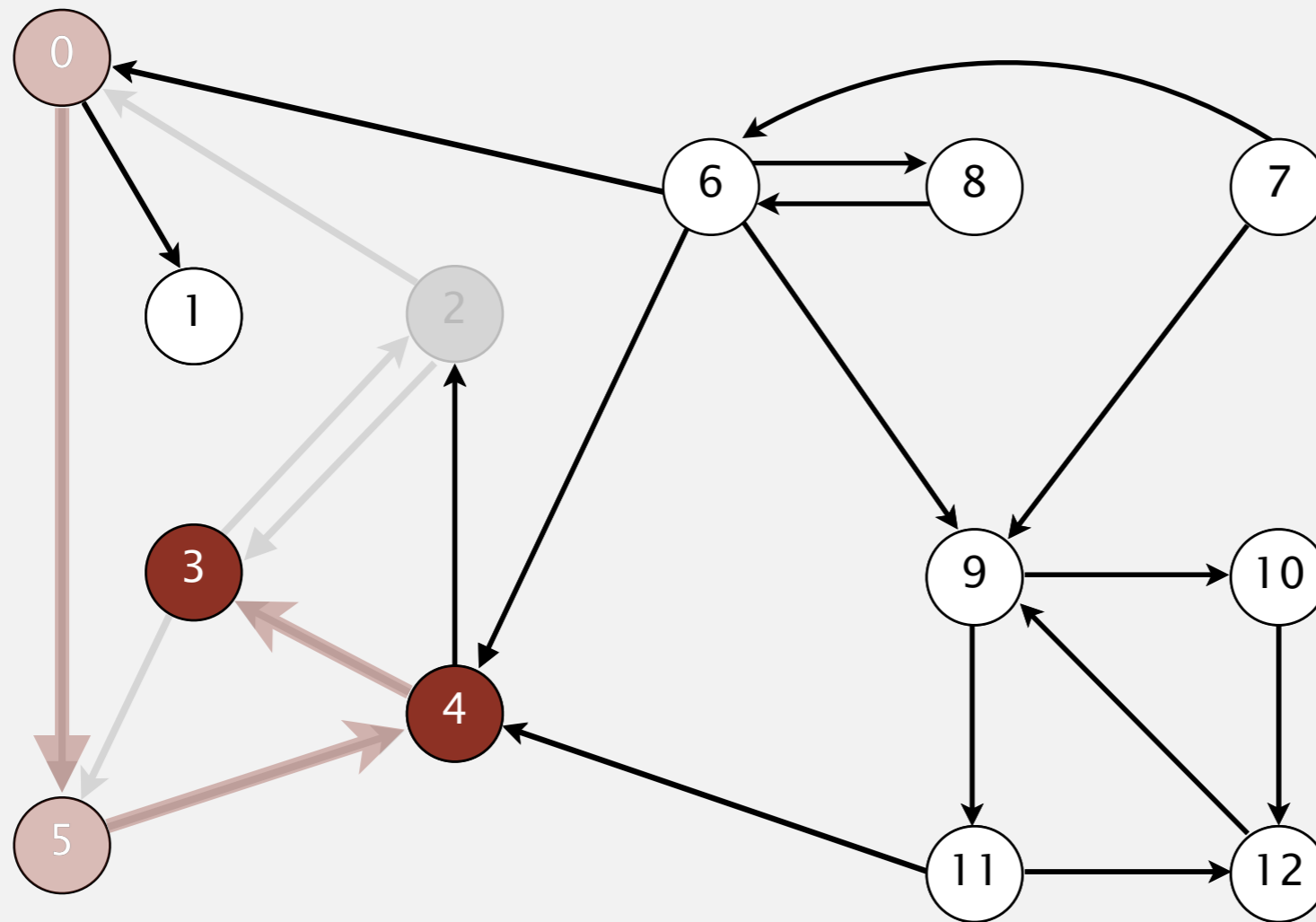
$v$	marked[]	edgeTo[]
0	T	-
1	F	-
2	T	3
3	T	4
4	T	5
5	T	0
6	F	-
7	F	-
8	F	-
9	F	-
10	F	-
11	F	-
12	F	-

done 2

# Directed depth-first search demo

To visit a vertex  $v$ :

- Mark vertex  $v$  as visited.
- Recursively visit all unmarked vertices pointing from  $v$ .



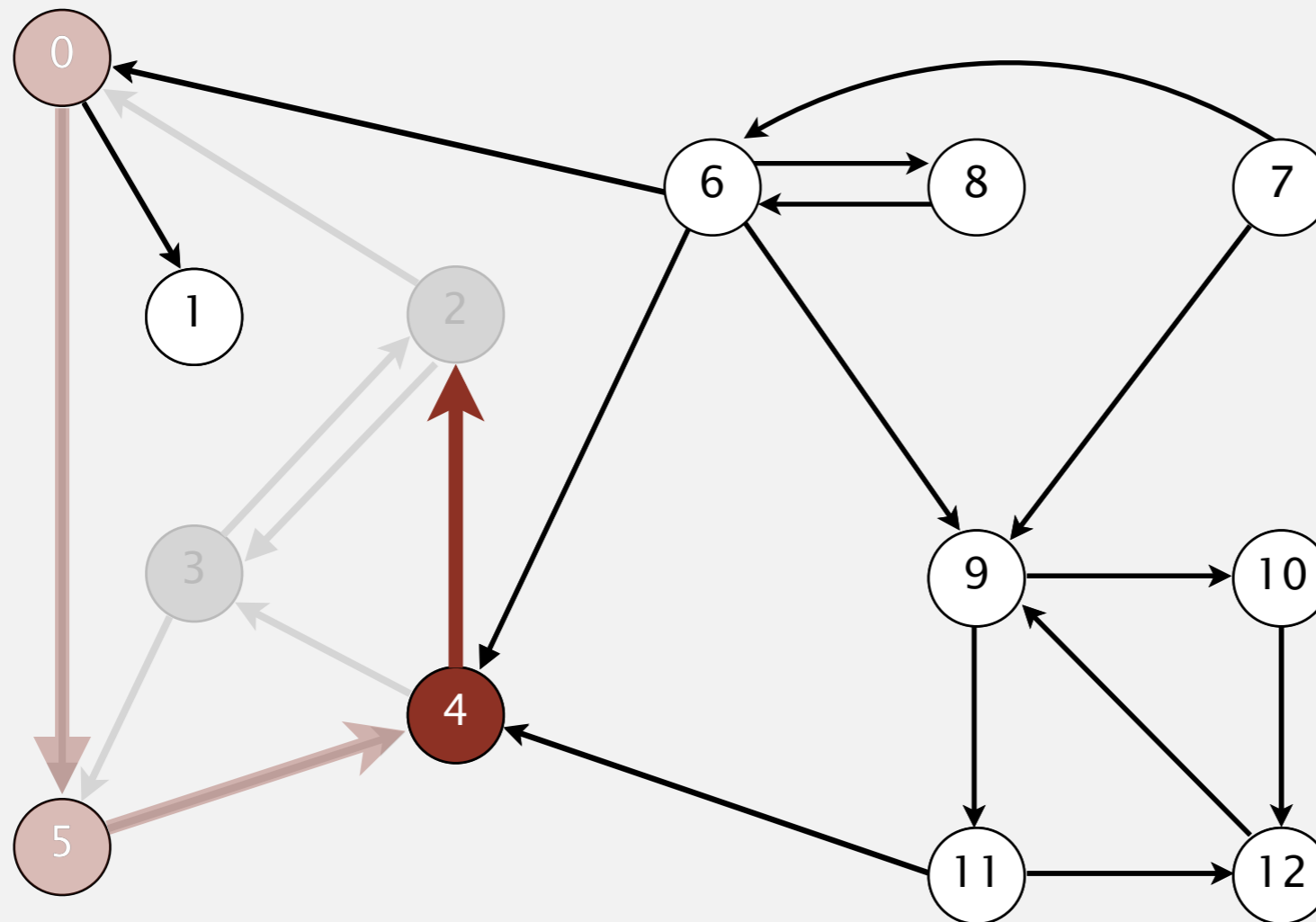
$v$	marked[]	edgeTo[]
0	T	-
1	F	-
2	T	3
3	T	4
4	T	5
5	T	0
6	F	-
7	F	-
8	F	-
9	F	-
10	F	-
11	F	-
12	F	-

done 3

# Directed depth-first search demo

To visit a vertex  $v$ :

- Mark vertex  $v$  as visited.
- Recursively visit all unmarked vertices pointing from  $v$ .



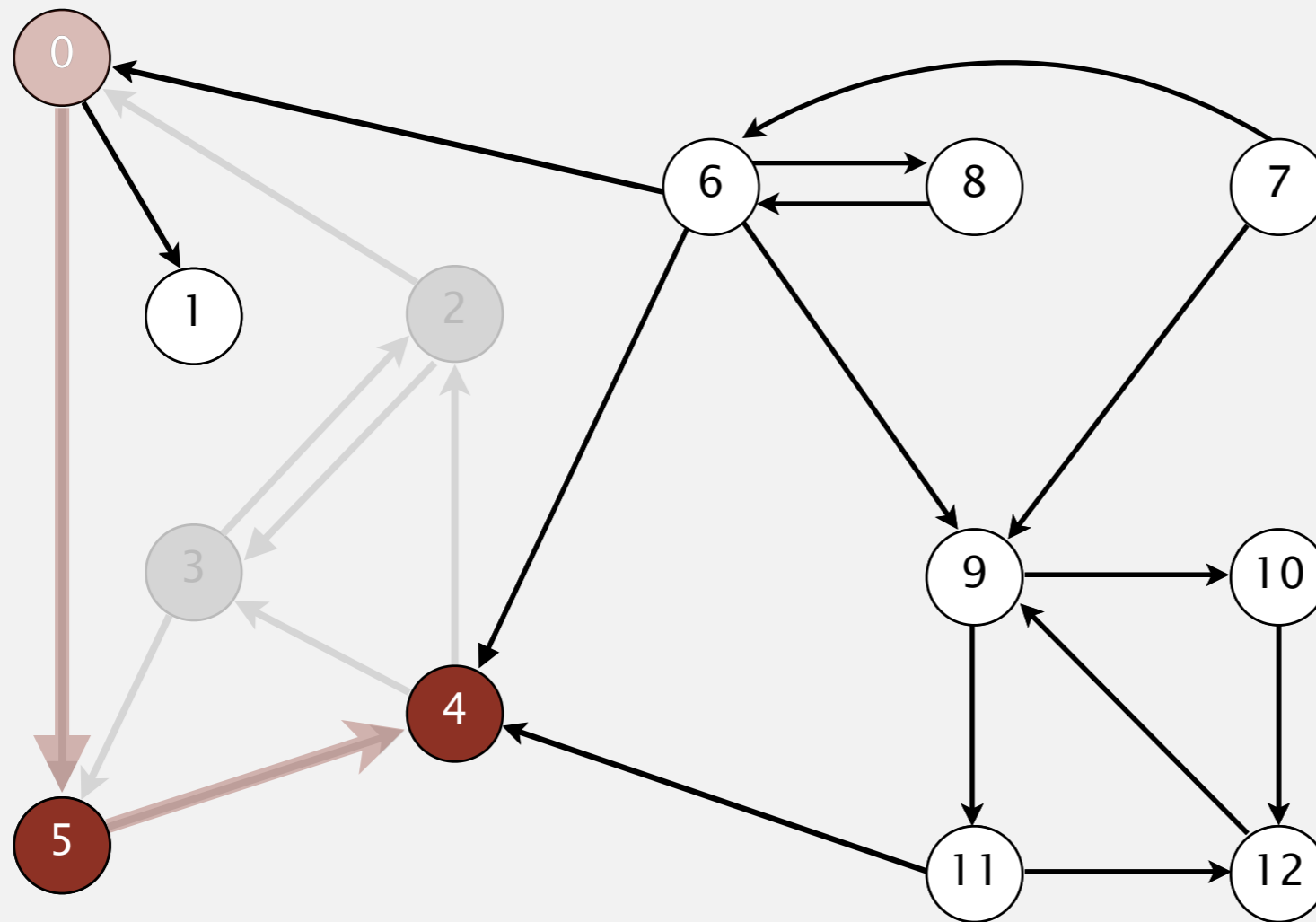
$v$	marked[]	edgeTo[]
0	T	-
1	F	-
2	T	3
3	T	4
4	T	5
5	T	0
6	F	-
7	F	-
8	F	-
9	F	-
10	F	-
11	F	-
12	F	-

**visit 4:** check 3 and **check 2**

# Directed depth-first search demo

To visit a vertex  $v$ :

- Mark vertex  $v$  as visited.
- Recursively visit all unmarked vertices pointing from  $v$ .



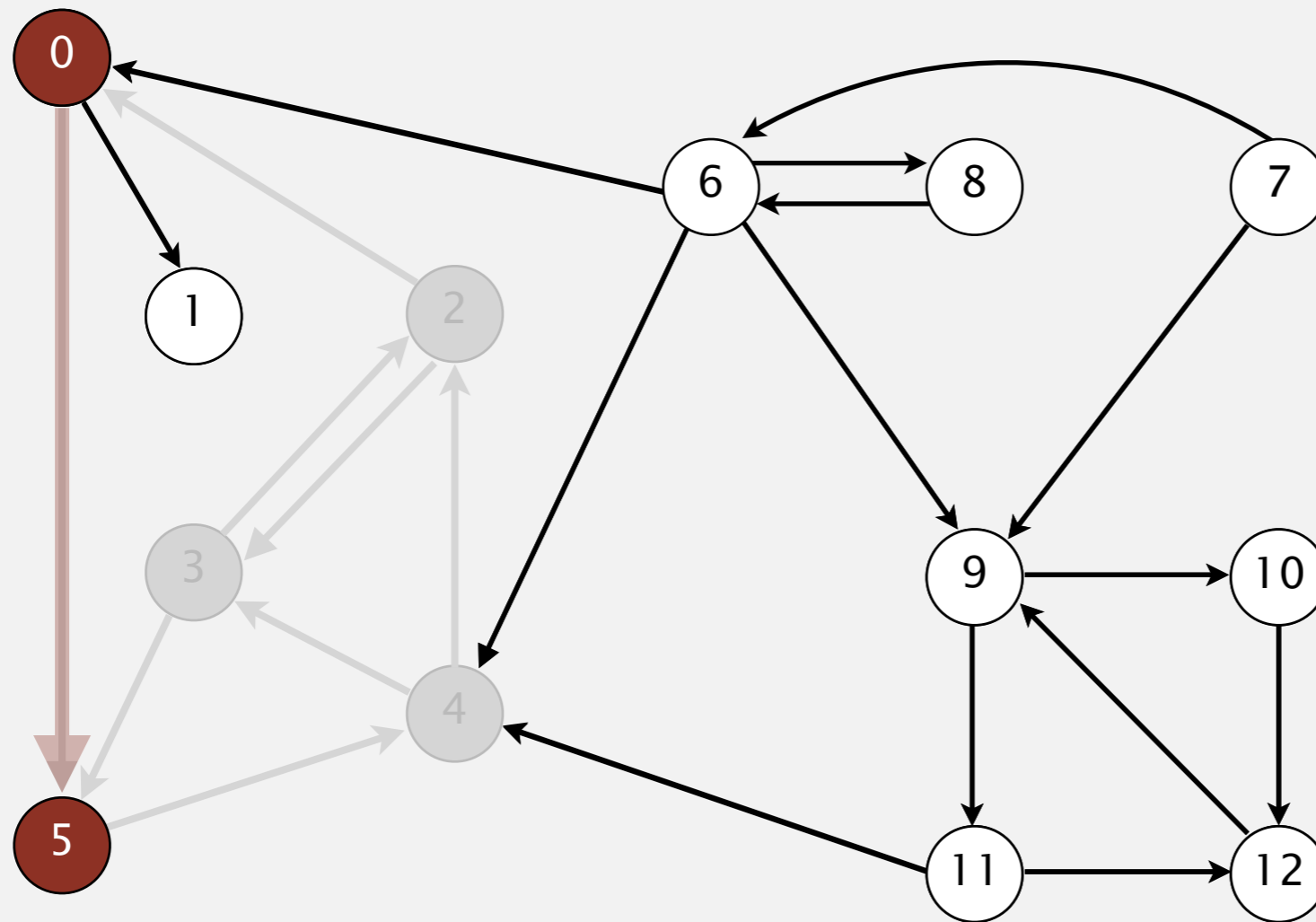
$v$	marked[]	edgeTo[]
0	T	—
1	F	—
2	T	3
3	T	4
4	T	5
5	T	0
6	F	—
7	F	—
8	F	—
9	F	—
10	F	—
11	F	—
12	F	—

done 4

# Directed depth-first search demo

To visit a vertex  $v$ :

- Mark vertex  $v$  as visited.
- Recursively visit all unmarked vertices pointing from  $v$ .



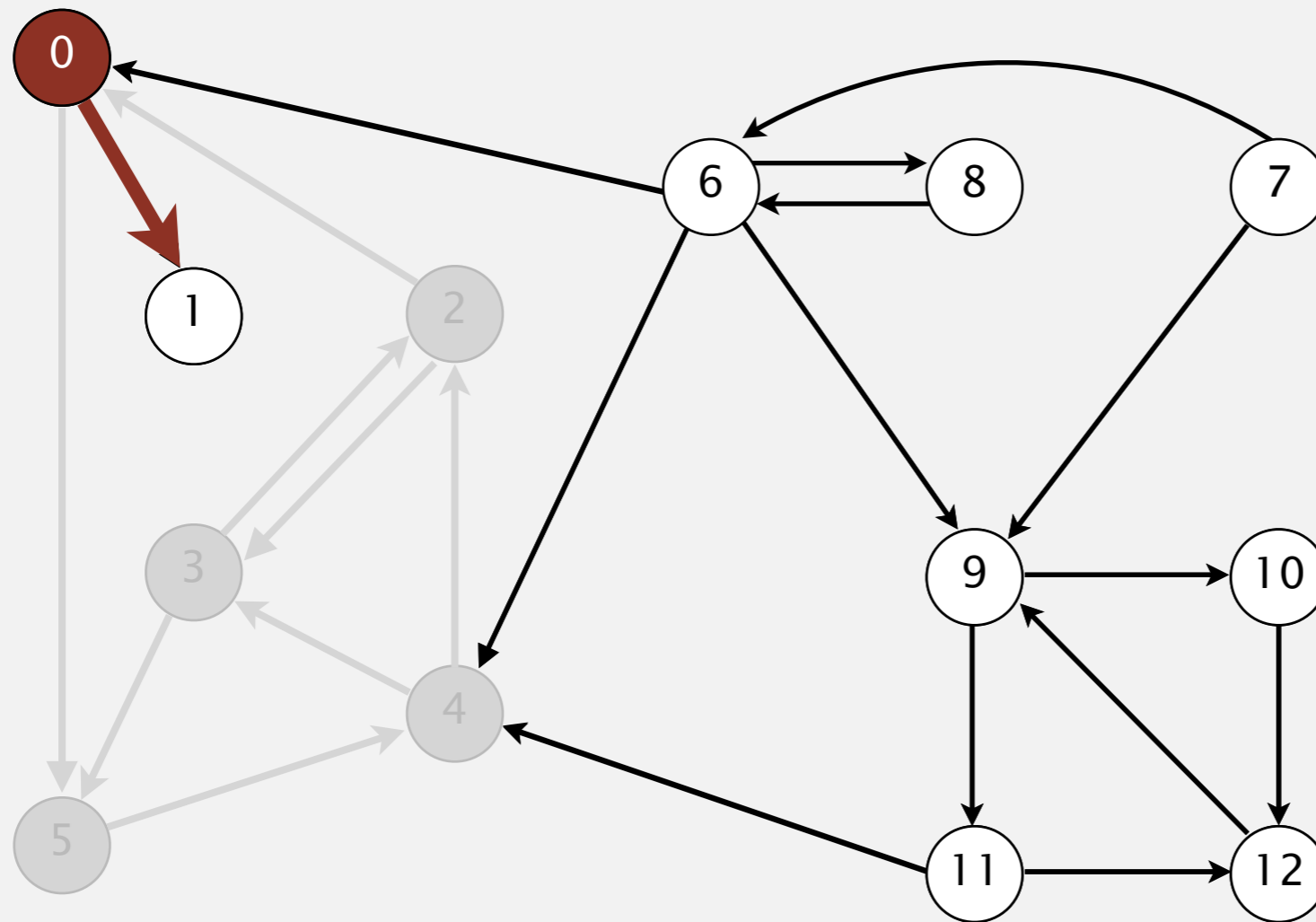
$v$	marked[]	edgeTo[]
0	T	-
1	F	-
2	T	3
3	T	4
4	T	5
5	T	0
6	F	-
7	F	-
8	F	-
9	F	-
10	F	-
11	F	-
12	F	-

done 5

# Directed depth-first search demo

To visit a vertex  $v$ :

- Mark vertex  $v$  as visited.
- Recursively visit all unmarked vertices pointing from  $v$ .



$v$	marked[]	edgeTo[]
0	T	-
1	F	-
2	T	3
3	T	4
4	T	5
5	T	0
6	F	-
7	F	-
8	F	-
9	F	-
10	F	-
11	F	-
12	F	-

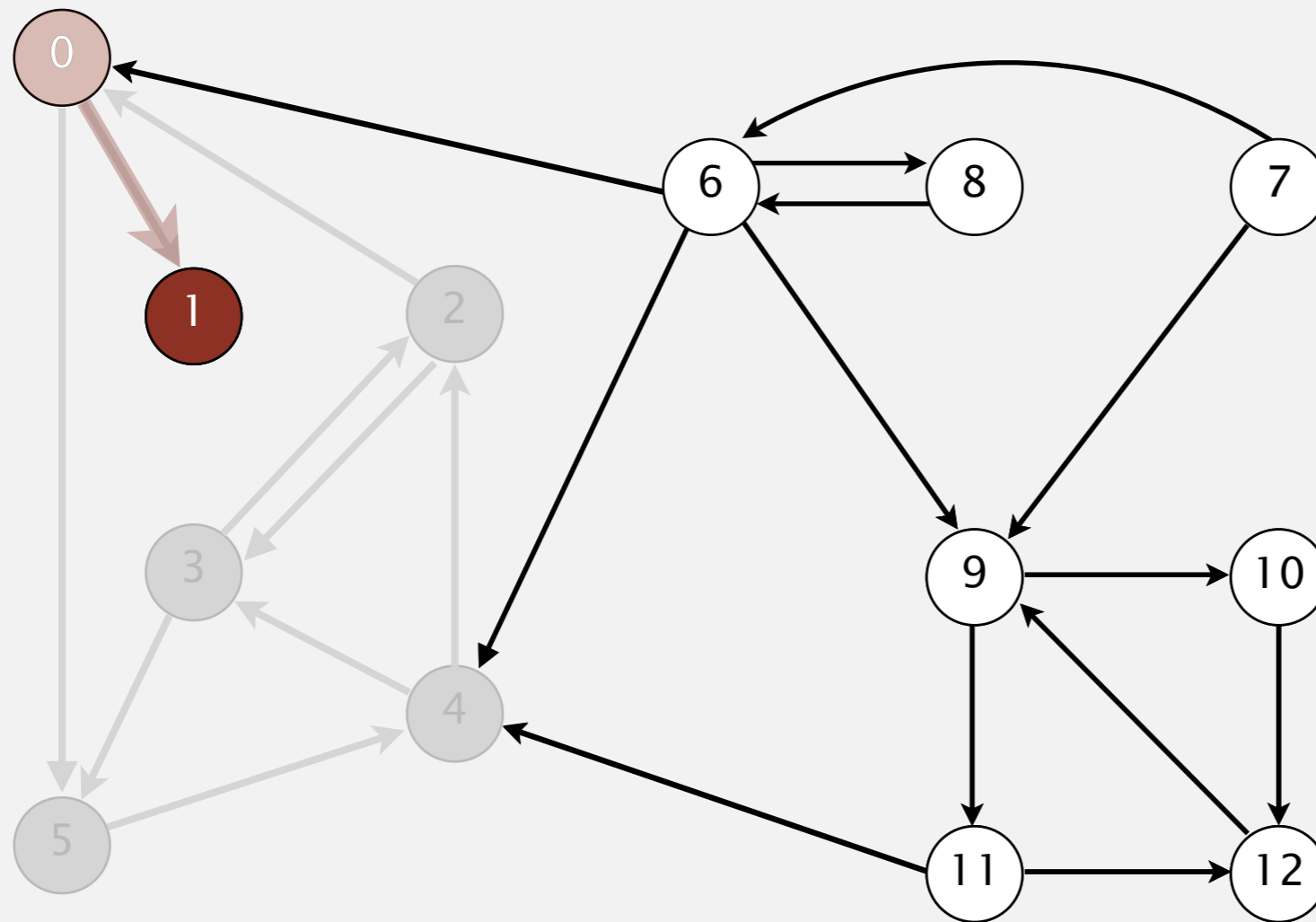
visit 0: check 5 and **check 1**



# Directed depth-first search demo

To visit a vertex  $v$  :

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- Recursively visit all unmarked vertices pointing from  $v$ .



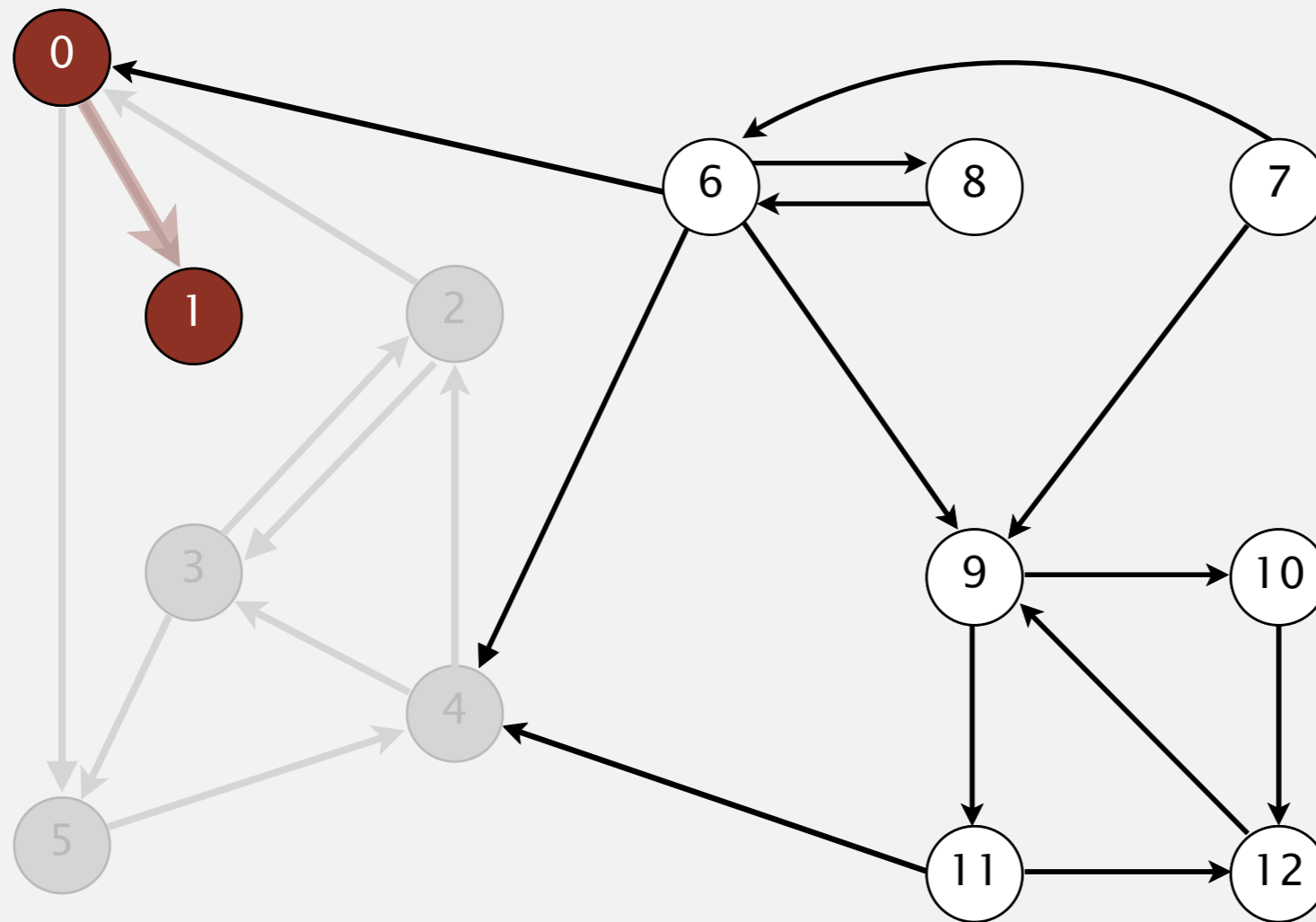
$v$	marked[]	edgeTo[]
0	T	-
1	T	0
2	T	3
3	T	4
4	T	5
5	T	0
6	F	-
7	F	-
8	F	-
9	F	-
10	F	-
11	F	-
12	F	-

visit 1

# Directed depth-first search demo

To visit a vertex  $v$  :

- Mark vertex  $v$  as visited.
- Recursively visit all unmarked vertices pointing from  $v$ .



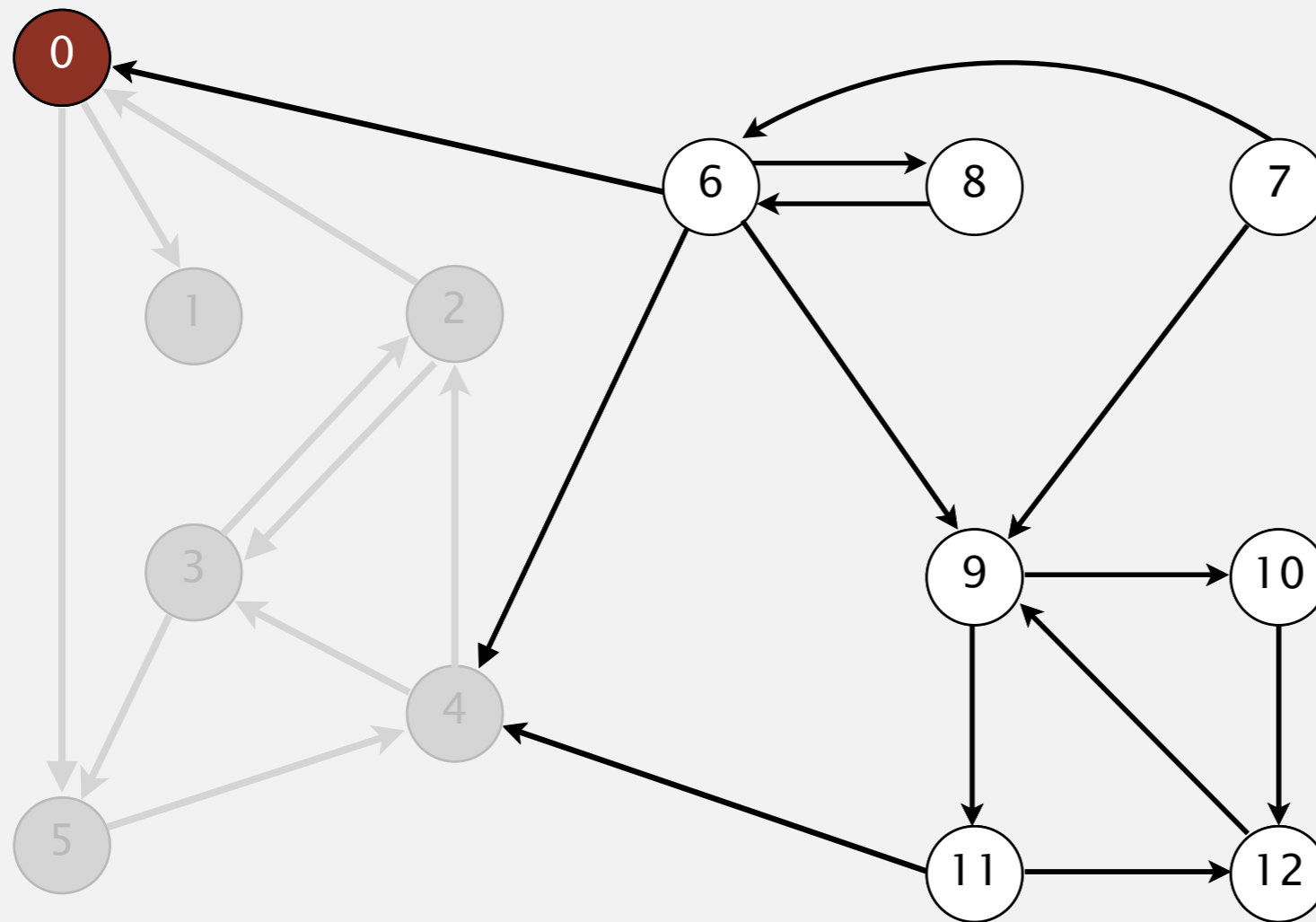
$v$	marked[]	edgeTo[]
0	T	-
1	T	0
2	T	3
3	T	4
4	T	5
5	T	0
6	F	-
7	F	-
8	F	-
9	F	-
10	F	-
11	F	-
12	F	-

done 1

# Directed depth-first search demo

To visit a vertex  $v$ :

- Mark vertex  $v$  as visited.
- Recursively visit all unmarked vertices pointing from  $v$ .



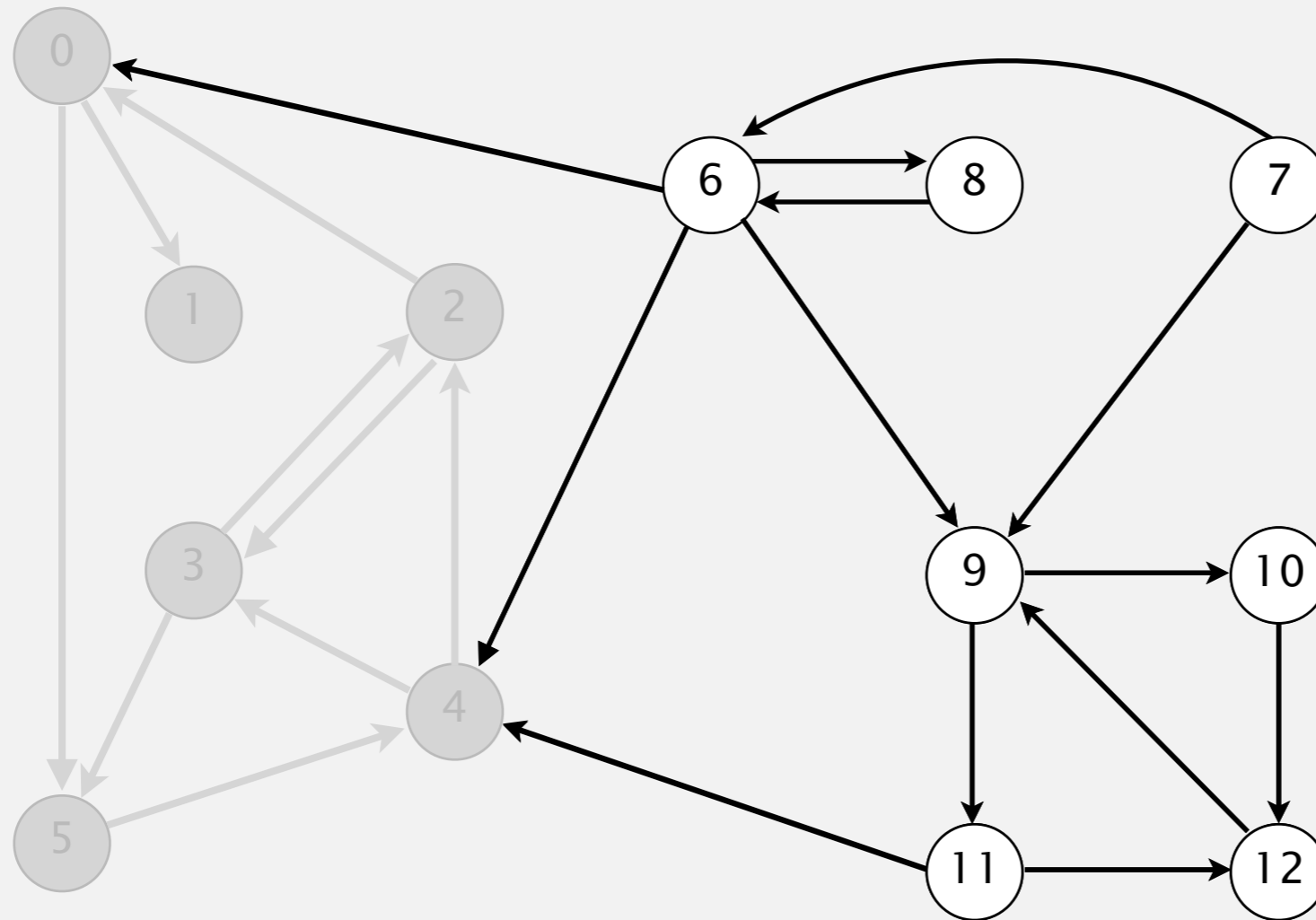
$v$	marked[]	edgeTo[]
0	T	-
1	T	0
2	T	3
3	T	4
4	T	5
5	T	0
6	F	-
7	F	-
8	F	-
9	F	-
10	F	-
11	F	-
12	F	-

done 0

# Directed depth-first search demo

To visit a vertex  $v$  :

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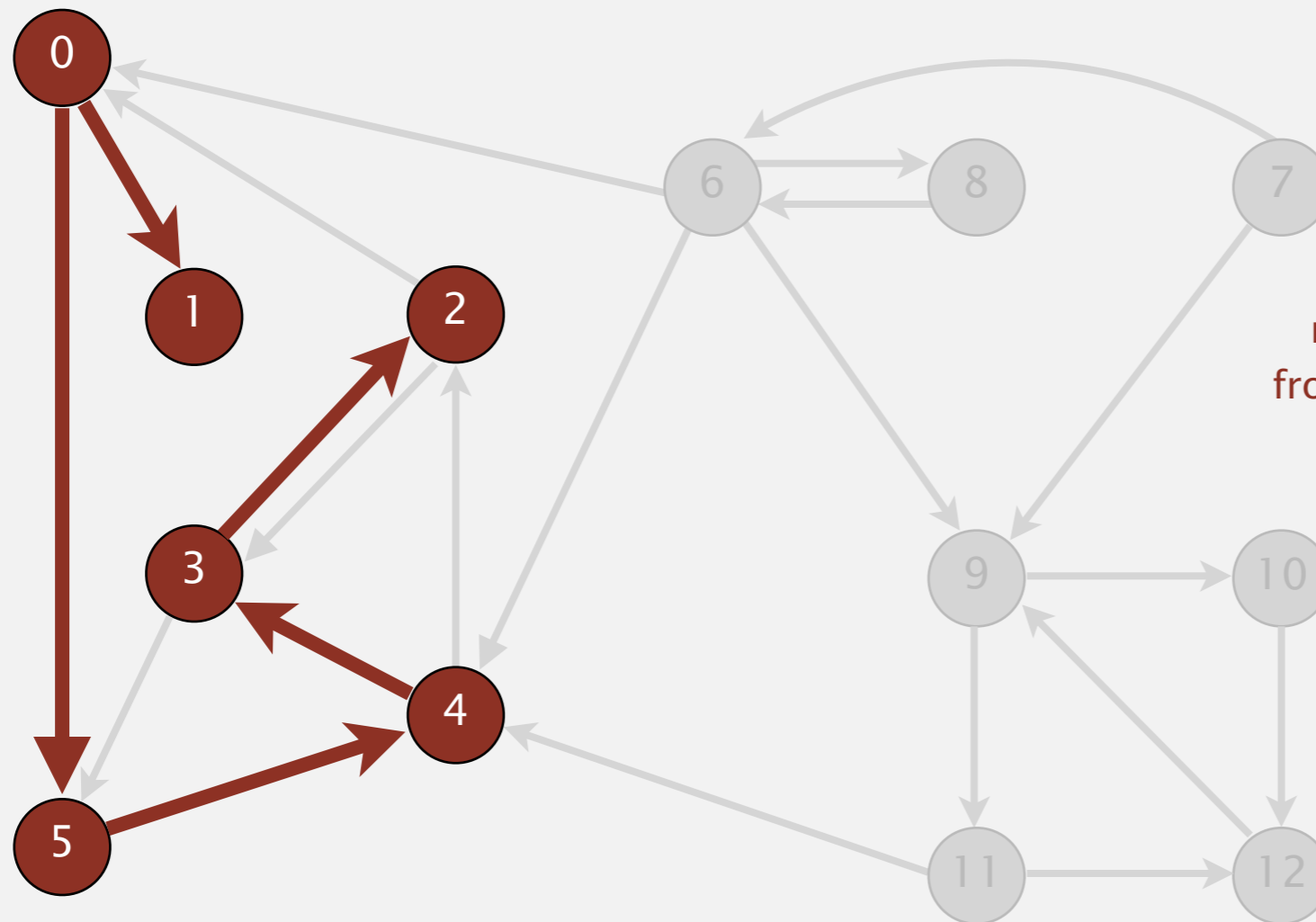
$v$	marked[]	edgeTo[]
0	T	-
1	T	0
2	T	3
3	T	4
4	T	5
5	T	0
6	F	-
7	F	-
8	F	-
9	F	-
10	F	-
11	F	-
12	F	-

done

# Directed depth-first search demo

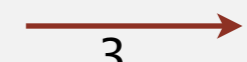
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$v$	marked[]	edgeTo[]
0	T	-
1	T	0
2	T	3
3	T	4
4	T	5
5	T	0
6	F	-
7	F	-
8	F	-
9	F	-
10	F	-
11	F	-
12	F	-

reachable from vertex 0



reachable from 0